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Research for the Future: An Overview of the FASEB Shared Research Resources Task Force's Finding and Recommendations

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ABSTRACT

The Federation of American Societies for Experimental Biology (FASEB) is composed of 28 member societies, representing over 115,000 individual scientists, including the Association of Biomedical Research Facilities and its members. As part of FASEB's mission to advance awareness and support of biological and biomedical research, the Federation remains committed to sustaining support for the resources that investigators use to conduct rigorous research. This includes shared resources and the core facility staff that enable researchers to have widespread access to state-of-the art technologies and expertise. Recognizing the fundamental role of shared resources in driving biomedical research progress, FASEB established the Shared Research Resources Task Force in June 2020 to discuss ongoing policy challenges related to shared resources and core facilities and identify ways to enhance their recognition and sustainability within the research enterprise. In addition to publishing a report outlining its final recommendations, the Task Force hosted a Virtual Roundtable with external stakeholders to exchange ideas and best practices about strengthening shared resources and elevating team science to its full potential. Taken together, these efforts demonstrate a key initial step toward addressing long-standing challenges and advancing shared priorities.

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INTRODUCTION AND OVERVIEW OF FASEB'S SHARED RESEARCH RESOURCES TASK FORCE

Research collaboration and innovative technologies remain central to biomedical research success. As the scientific enterprise evolves to meet the challenges of the modern world, shared resources and a strong research infrastructure are more crucial than ever. However, access to and funding for these resources have not kept pace with research demand. If left unaddressed, inadequate support for shared resources and core facilities could delay scientific progress and prohibit the next generation from pursuing research careers.

To address these and various other challenges associated with shared resources, the Federation of American Societies for Experimental Biology (FASEB), a coalition of 28 member societies across a broad range of biological and biomedical science disciplines, established the Shared Research Resources (SRR) Task Force in June 2020. As part of its charge, the Task Force was tasked with identifying the barriers and opportunities for policy changes within the SRR landscape. The knowledge gained from these discussions helped inform the

Task Force's recommendations on future advocacy strategies for federal agencies, institutions, and individual core facilities. Together, these recommendations established a roadmap for stakeholders to adapt to their individual needs and, more importantly, use as a resource to increase awareness about the cross-cutting value of SRR and their potential to elevate biomedical research to the next level.

This paper will provide an overview of the FASEB SRR Task Force's findings, as outlined in the final report and subsequent policy brief. Additionally, this paper will highlight key takeaways derived from the June 2021 Virtual Roundtable, a convening of over 100 public and private stakeholders to exchange feedback and best practices on strategies to promote sustained recognition of team science, core facilities, and shared resources. Finally, the paper includes suggested next steps for stakeholders to consider as implementation and advocacy moves forward.

FASEB SRR TASK FORCE FINAL REPORT AND POLICY BRIEF

A key part of the FASEB SRR Task Force's discussions over the course of its 1-year term centered on the systemic challenges researchers, institutions, and individual core facilities face in achieving consistent support and access to state-of-the-art technologies and scientific expertise. Accordingly, the Task Force's final report builds on the findings from the FASEB 2017 report, *Maximizing Shared Research Resources*,[1] and provides actionable policy and institutional strategies for biomedical research stakeholders to address shared difficulties related to SRRs.

To grow a robust and sustainable SRR ecosystem, the final report emphasizes the role of forward-thinking at the local, state, and federal levels. In particular, 5 key areas are fundamental to the recognition and sustainability of SRRs:

1. Improve institutional stewardship of SRRs;
2. Expand access to SRRs;
3. Grow a more diverse, equitable, and inclusive SRR workforce;
4. Increase and sustain investments in SRRs; and
5. Prioritize sustainability in SRR decision-making.

Achieving these objectives will require a concerted, sustained effort between research stakeholders, as discussed in the report's 4 sections, summarized below.

Section I: Regional, Institutional, and National Strategies

The first section of the report emphasizes how regional, institutional, and national entities serve as the foundation by which SRRs operate to drive scientific research forward. While each component possesses

unique characteristics and responsibilities, there are excellent opportunities to leverage the commonalities between these groups to enhance research productivity. At the regional level, the report underscores the need for partnerships both within institutions and across institutional boundaries. By developing regional SRR capabilities—such as through regional training opportunities and internships—institutions can foster equitable access to SRRs. Coordinated partnerships are particularly important for expanding SRR access to early- and mid-career scientists as well as underrepresented minority researchers.

Implementing SRR-centric national strategies will help strengthen the biomedical research enterprise by ensuring a level playing field for the research community, many of whom have distinct needs and varying levels of federal and institutional support. To ensure equitable access to a standard level of research infrastructure, the report emphasizes the importance of providing funding mechanisms that address the range of capabilities and technical sophistication observed by institutions. This is particularly critical for small institutions who not only face difficulties in acquiring funding for basic and high-end equipment but also struggle recruiting and retaining staff with the necessary expertise.

Section II: Role of Stakeholders and Funding Agencies

For genuine change to occur, stakeholders and funding agencies must fulfill their role in the policy-making process. The second section of the final report, "Role of Stakeholders and Funding Agencies," underscores the shared responsibilities of each of these groups while defining their unique capabilities in contributing to the success of SRRs and biomedical research writ large. For example, stakeholders—defined as institutions, professional societies, nonprofit organizations, and private entities—can facilitate streamlined processes that enable improved regional and national sharing of resources by developing more effective contracts and memoranda of understanding between institutions. Establishing models or templates of effective regional sharing will encourage other institutions—particularly small institutions with less support and bandwidth—to adapt successful models to their own individual needs. More importantly, successful examples will elucidate the powerful return on investments created by team science and resource sharing to institutions that may be hesitant to leverage SRRs more broadly across their campuses. Communication of these and other SRR-relevant opportunities is essential. Stakeholders must make every effort to share what has worked well for their individual facility, department, or institution as well as the challenges and difficulties they face. An informed and engaged SRR community will ensure cohesion, synergy, and a strengthened ability to advocate for SRRs with policymakers and institutional leadership.

The second section of the final report also emphasizes how funding agencies are uniquely positioned to demonstrate how SRRs can be true catalysts for research discovery and should therefore lead by example. Incentivizing resource sharing and team science will prompt researchers and institutions to not only leverage SRRs into its research programs but also consider SRRs as part of the institution's values and approach to science more broadly. Ways in which funding agencies could achieve this include: 1) ensuring existing funding opportunities acknowledge and incorporate use of SRRs; 2) expand opportunities for funding SRR scientists,

basic equipment, shared multi-component instrumental systems, and instrumental upgrades; and 3) provide specific incentives for the SRR trainee workforce to educate future scientists about SRR career opportunities. Regarding the latter, one recommendation offered in the report is adapting the NIH's R50 mechanism[2]—currently only offered through the National Cancer Institute—both across NIH's Institutes and Centers as well as Directorates inside the National Science Foundation. To ensure the next generation of scientists is equipped with the knowledge and resources needed to propel scientific innovation forward, it is critical that funding agencies raise awareness about SRR careers while offering support for researchers who may not wish to pursue careers as independent investigators.

A clear example of how funding agencies could take the lead in championing SRRs is outlined in a policy brief the Task Forced authored in the months following the release of the final report. The paper, *Establishing a National Strategy for Shared Research Resources in Biomedical Sciences*,[3] calls on the NIH to create an SRR Working Group within the Advisory Committee to the Director (ACD). As the primary advisory body to the Office of the Director, the ACD is a valuable oversight mechanism for providing policy and programmatic recommendations to the agency director. To achieve this, the ACD assembles short-term Working Groups to assess the status of research issues relevant to the NIH's mission and propose steps for the agency to take to maximize their full potential. Examples of NIH ACD Working Groups include changing the culture to end sexual harassment, improving diversity in science, and enhancing rigor and reproducibility in animal research[4]. As discussed in the policy brief, an ACD SRR Working Group not only aligns with the NIH's mission to catalyze research discovery into public health advances but could also help promote a broad range of current trans-NIH initiatives more efficiently.

Section III: Institutional Responsibilities and Strategies for Advancement of SRRs

As the largest section of the report, the FASEB SRR Task Force outlines the various strategies institutions can use to better integrate SRR into their existing research and infrastructure frameworks. Importantly, a strong and engaged institutional oversight body—such as an SRR Advisory Committee—can facilitate improved awareness, compliance, and synergy across departments by communicating the value of SRRs and identifying opportunities to connect SRR with intramural and extramural research projects.

Furthermore, to maximize the return on investment and impact of SRR, institutions should formulate a strategic plan that leverages SRR's cross-cutting capabilities. While most academic institutions have an existing plan that describes its mission and priorities, SRR and core facility staff are frequently not involved in the strategic planning process—a missed opportunity to take advantage of SRR's ability to advance an institution's goals in an affordable, effective, and interdisciplinary manner. Apart from ways scientific technology and staff can support research across institutional domains, an SRR-centric strategic plan should include disaster resiliency plans and plans to regularly evaluate SRR to ensure continued relevance and, more importantly, proper stewardship of institutional and federal funds.

Another component the Task Force identified as a key institutional responsibility is SRR faculty and staff professional development. Without the people and expertise running the core facilities, science would not be able to advance at the speed or agility that drives biomedical research forward. The final report offers numerous ways for institutions to cultivate a personnel-focused SRR environment, including providing specialized career paths (tenure and nontenure paths alike) for core directors and staff and implementing protected policies for SRR staff to allow them to pursue independent research and facility management skills.

Section IV: Strategies for SRRs

The fourth section of the report, "Strategies for SRRs," accentuates how core facilities and SRR programs do not ascribe to a "one size fits all" model given the varying types of management, reporting, and operational models. However, despite the heterogeneity across facilities and institutions, the stakeholders invested in the long-term sustainability of SRR remain remarkably similar. The FASEB SRR Task Force categorized stakeholders according to the frequency of their interactions with the core facility:

1. Operational: stakeholders who interact with the facility on a frequent, often daily, basis and are intimately involved in the day-to-day functions;

2. Integrative: stakeholders who interact with the core facility on a less frequent basis but serve as the scaffold that enables key research functions to thrive, such as administrative support and building management; and

3. Strategic: stakeholders who communicate with individual core facilities on an as-needed basis but remain vital to its funding and sustainability.

While understanding the interconnectedness of the stakeholder landscape is important, the FASEB SRR Task Force underscores the need for the SRR community to go one step further and cultivate bidirectional relationships between all 3 stakeholder categories. There are countless advantages to strengthening communication, including improved development of best practices and enhanced ability to address the inequity gaps prevalent among many core facilities and SRR programs.

FASEB SRR VIRTUAL ROUNDTABLE

Following the publication of the Task Force's final report, FASEB organized a virtual roundtable to create awareness about the report's recommendations and begin an ongoing dialogue about how to best address the challenges and gaps within the SRR ecosystem. Academic leaders, federal agency representatives, and industry experts shared their perspectives on leveraging team science in their respective fields and using SRR as a vehicle to achieve enhanced research efficiency nationwide.

In addition to engaging in small group discussions on specific topics outlined in the Task Force's final report, roundtable participants completed a survey for additional feedback and examples. One of the main questions,

"What is the biggest challenge in achieving more robust funding for SRR?" prompted strong responses from participants. Answers were largely consistent, with difficulties arising from 1 of 3 areas: institutions, funding agencies, and Congress. For example, at the institutional level, many respondents indicated the lack of champions for SRR among leadership. At the funding agency level, several respondents pointed to the lack of policy harmonization across programs and agencies; additionally, respondents noted the increasing trend of more funding going to fewer, larger universities rather than smaller institutions who already lack the support and bandwidth to maintain their core facilities. Unfortunately, such funding gaps have widened access and support disparities for many researchers looking to use SRR, with the burden primarily falling on underrepresented minority individuals.

Perhaps the ultimate challenge in securing greater support for SRR lies at the Congressional level. After all, while funding agencies allocate the money to support institutions with core facilities through varying types of grant mechanisms, how *much* funding the agencies can provide directly depends on the amount of appropriations given by Congress. As noted by several roundtable participants, there is an inadequate understanding in Congress about the value of SRR and their connection to scientific progress. Without this understanding, the SRR community lacks a clear champion who can advocate for shared resources by securing more funding and elevating their visibility among nonscientists. Because appropriations are decided every year —typically around the spring and summer time—research stakeholders, including SRR users, faculty, and staff, have an opportunity to communicate with their lawmakers about the scientific and economic value shared resources bring to the local district. However, this remains an ongoing challenge, further underscoring the need to establish a clear and unified message from SRR experts that can be conveyed on Capitol Hill.

NEXT STEPS AND FUTURE OPPORTUNITIES

A strong research infrastructure—including shared resources that allow broad access to essential scientific technologies and expertise—is the bedrock for a robust research ecosystem. While recognition for SRR is growing, the existing policy gaps reveal a vast amount of untapped potential at all levels of governance. To unlock the full capabilities of SRR and accelerate the next generation of scientific discovery, stakeholders must continue increasing awareness about the value of SRR with institutional, federal agency, and Congressional leaders. Importantly, the SRR community should recognize the unique roles and responsibilities for each of these entities and tailor advocacy strategies accordingly. This includes Congress's role in allocating increased appropriations for funding agencies and the agencies' responsibility to utilize this funding to support SRR through various mechanisms, including research, training, and construction grants. While meaningful change takes time, the FASEB SRR Task Force final report represents the first step in building a cohesive strategy toward achieving these bold but necessary goals in strengthening SRR and its workforce.

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